

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-023959

(43)Date of publication of application : 25.01.2000

(51)Int.Cl.

A61B 6/00
H05G 1/44

(21)Application number : 10-198906

(71)Applicant : SHIMADZU CORP

(22)Date of filing : 14.07.1998

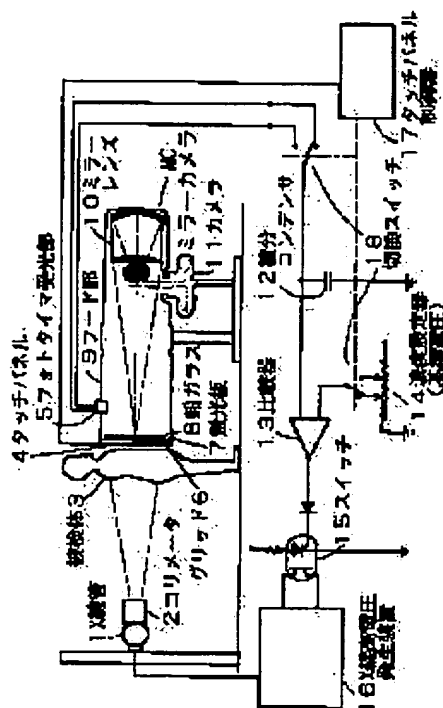
(72)Inventor : KATAYAMA TOMOMI

(54) RADIOGRAPHIC INSTRUMENT

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a radiographic instrument in which a plurality of phototimer photocell parts are automatically selected simply when a subject touches an imaging table while taking an imaging position.

SOLUTION: When a subject 3 touches a touch panel 4 while taking an imaging position, its signal urges the CPU of a touch panel controller 17 to compute X-Y coordinates to recognize a contact surface and to select an optimum phototimer photocell part from a plurality of phototimer photocell parts while automatically switching a selector switch 18 to start imaging. X-rays from an X-ray tube 1 are constricted by a collimator 2, are transmitted through the subject 3 as scattered rays are eliminated by a grid 6, and converted into an optical image by a fluoroscopic plate 7. Only a specific portion of light emitted through lead glass is captured by the phototimer photocell part 5 and its electric signals are integrated by an integrating capacitor 12, with its voltage and the reference voltage of a density setter 14 both inputted to a comparator 13; when both of the voltages are the same, a high-voltage shutoff signal is fed to a switch 15 to shut off the high voltage of an X-ray high voltage generator 16 to stop X-ray radiation, thus making it possible to take radiograph at the optimum density.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.*** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]

[Claim 1] In the X-rays equipment equipped with two or more phototimer light sensing portions which detect the transparency X-ray of analyte, and the phototimer control circuit which sends an X-ray cutoff signal to a high-voltage apparatus when the integral value of the electrical signal from a phototimer light sensing portion reaches reference voltage X-rays equipment characterized by having the means which can choose automatically the phototimer light sensing portion which prepared the touch panel which detects analyte posture in the X-ray input screen of a camera base, and was suitable for analyte posture from said two or more phototimer light sensing portions with the detecting signal of a touch panel.

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention relates to the automatic exposure control which controls automatically the film density at the time of X photography the optimal about X-rays equipment.

[0002]

[Description of the Prior Art] The automatic-exposure-control equipment in X photography is used for almost all photofluorography, and is widely used also for the radiograph of a thorax, an abdomen, etc. Automatic-exposure-control equipment operates so that film density may be kept constant by controlling exposure time automatically, it changes into an electrical signal X dosage which penetrated analyte, when this quantity of electricity reaches constant value, an X-ray tends to be intercepted, and it is going to obtain the film density to wish.

[0003] The X-rays equipment of automatic exposure control using the mirror camera MC for X-ray photofluorography used for the mass screening of the conventional thorax is explained to drawing 6. The X-ray beam from X-ray tube 1 is irradiated by required visual field size with a collimator 2 at the rat tail analyte 3. The scattered radiation is removed by the grid 6, and incidence of the X-ray which penetrated analyte 3 is carried out to a fluorescent screen 7, and it is changed into a light figure by the transparency X-ray. The lead glass 8 for X-ray protection is formed behind that fluorescent screen 7, and the light figure of a fluorescent screen 7 carries out image formation to the film plane of a camera 11 with the mirror lens 10 in a hood 9 through this lead glass 8. On the other hand, two or more phototimer light sensing portions 5 are formed in the interior of the front upper part of the hood 9 of this mirror camera MC, and it is set as the device in which each phototimer light sensing portion 5 can receive the light of the specific region of the luminescence side of a fluorescent screen 7. Therefore, before taking a photograph, a way person chooses one of the phototimer light sensing portions 5 corresponding to the specific region suitable for a photography part manually on a control panel (change-over switch 18 of drawing 6).

[0004] Arrangement of the specific region suitable for the photography part in the thorax photography to drawing 7 was shown. In the object for thorax transverse planes, two light sensing portions 25 for thorax transverse planes of a part with the wide width of face of both lungs are used, and the light sensing portion 26 for thorax side faces of a longwise central part is used at the object for thorax side faces. During photography, the selected phototimer light sensing portion 5 catches the light of the specific region of a luminescence side, and detects it as a current signal proportional to X dosage. This current signal is inputted into a phototimer control section (control section which consists of a change-over switch 18, an integrating capacitor 12, a concentration setting calibration master 14, a comparator 13, and a switch 15), and it integrates with it to the integrating capacitor 12 of this phototimer control section, and it is inputted into a comparator 13 as a voltage signal. On the other hand, a comparator 13 outputs an X-ray cutoff signal to a switch 15, when the voltage signal and reference voltage with which it integrated from the concentration setter 14 with reference to the reference voltage which determines the concentration of a film are compared and both are in agreement. In response to this signal, the X-ray high-voltage transformer assembly 16 intercepts the high voltage, and stops the X-ray emission from X-ray tube 1.

[0005]

[Problem(s) to be Solved by the Invention] Although the conventional X-rays equipment is constituted as mentioned above, since it corresponds to various posture of analyte, two or more light sensing portions are prepared, the way person has switched the phototimer light sensing portion 5 manually on the control panel before photography, before various activities of ID registration of analyte, a photography electrical potential difference, a setup of a photography current, etc. taking a photograph, there is, and there is a problem of mistaking a change-over of the phototimer light sensing portion 5. When there is much subject, such as a thorax mass screening, in order to prevent the change-over mistake of a light sensing portion, when the light sensing portion for side faces is chosen, in photography of a thorax transverse plane and a thorax side face, approaches, such as sounding a buzzer, are taken, but there is a problem that a way person has to switch manually in that case.

[0006] This invention aims at offering the X-rays equipment which can do a change-over automatically, even if it is made in view of such a situation and a way person does not switch the phot timer light sensing portion 5 manually.

[0007]

[Means for Solving the Problem] In order to attain the above-mentioned purpose, the X-rays equipment of this invention In the X-rays equipment equipped with two or more phototimer light sensing portions which detect the transparency X-ray of analyte, and the phototimer control circuit which sends an X-ray cutoff signal to a high-voltage apparatus when the integral value of the electrical signal from a phototimer light sensing portion reaches reference voltage The touch panel which detects analyte posture is prepared in the X-ray input screen of a camera base, and it is characterized by having the means which can choose automatically the phototimer light sensing portion which was suitable for analyte posture from said two or more phototimer light sensing portions with the detecting signal of a touch panel.

[0008] The X-rays equipment of this invention is constituted as mentioned above, a touch panel detects the field of the part touched by attaching a touch panel in the image reception area of a camera base, and since the phototimer light sensing portion suitable for the part is chosen automatically, the need that a way person switches manually is lost.

[0009]

[Embodiment of the Invention] One example of the X-rays equipment of this invention is explained referring to drawing 1. This equipment consists of X-ray tube 1, the touch panel 4 attached in the front face of an input of the mirror camera MC for photofluorography, and this mirror camera MC, the phototimer light sensing portion 5 which takes up the light of the X-ray image on a fluorescent screen, a phototimer

control section which performs automatic exposure control, a touch panel controller 17, and an X-ray high-voltage transformer assembly 16, and the phototimer control section consists of a circuit changing switch 18, the integrating capacitor 12, a concentration setter 14, a comparator 13, and a switch 15.

[0010] The touch panel 4 currently used for this invention is attached in the front face of the image reception area in which the X-ray image which penetrated the analyte 3 of the hood 9 of the mirror camera MC for photofluorography carries out incidence. This touch panel 4 is a thing using the touch location detection method of an ultrasonic surface-acoustic-waves method, is the glass panel plate whose light transmittance is about about 90%, and is stuck, set and used for a CRT monitor, the display side of a LCD monitor, etc. Here, although it does not need to be transparent, since the lighting range of the phototimer light sensing portion 5 is displayed on the X-ray incidence side front face of the hood 9 of a mirror camera MC, this is observable.

[0011] As this touch panel 4 is shown in drawing 2, the surface acoustic waves with which each slit of propagation and a reflective array reflected the reflective array top as surface acoustic waves, and the supersonic wave generated from the ultrasonic radiator (the X-radiator 19, Y-radiator 21) in the corner of a panel spread to all the corners of a panel, and spread the panel top are collected by the reflective array of the opposite side, and return to a carrier pendulum (X-carrier pendulum 20, Y-carrier pendulum 22). In the surface acoustic waves which pass along the minimum distance a then, and the surface acoustic waves which pass along the longest distance c, if time difference was produced in time of concentration and the analyte section has touched in the B point in the time difference, the surface acoustic waves which pass along b will be absorbed by the analyte section, and will be recognized by the carrier pendulum as return and location detection data as a reduced wave. The amount of the surface acoustic waves absorbed by the analyte section can also be recognized as Z direction data. Drawing 3 shows a time change of the dispatch signal 23 and input signal 24 on the strength. CPU of the touch panel controller 17 changes this time location into X coordinate and Y coordinate.

[0012] Next, actuation of the X-rays equipment of this invention is explained. First, analyte 3 is located on a camera base and pushes the body against a touch panel 4 by the posture to photo. Although drawing 4 shows the page [of the image reception area in 30 / 27th] touch part 29 at least for a thorax forward surface part and drawing 5 shows the touch part 28 to the image reception area 27 in the case of the thorax side-face part 31, it is shown that these drawing 4 and drawing 5 need selection of the lighting part of the phototimer light sensing portion 5 in order to obtain the optimal film density in transverse-plane photography and side-face photography of a thorax.

[0013] As for a touch panel 4, delivery, and the X coordinate and Y coordinate of a touch part (28 of 29 or drawing 5 of drawing 4) of the analyte are first read by CPU of the touch panel controller 17 in CPU of the touch panel controller 17 in the touch signal. The phototimer light sensing portion 5 which recognizes this coordinate pattern and has [from] the optimal lighting range among two or more phototimer light sensing portions 5 is chosen. Drawing 1 shows the case where it has two phototimer light sensing portions, the object for thorax transverse planes, and the object for thorax side faces, 5. The change-over switch 18 for the selection is switched by the signal of the touch panel controller 17. A change-over switch 18 switches a change-over of the phototimer light sensing portion 5, and the reference voltage of the concentration setter 14 which determines the film density suitable for it. Actuation of a change-over switch 18 is performed automatically, and there is no need that a way person sets up manually.

[0014] Roentgenography can begin in this condition. The actuation is the same as conventional equipment, and is irradiated by the visual field size which needs the X-ray beam from X-ray tube 1 at a collimator 2 at a rat tail and analyte 3. The scattered radiation is removed by the grid 6, and incidence of the X-ray which penetrated analyte 3 is carried out to a fluorescent screen 7, and it is changed into a light figure by the transparency X-ray. The lead glass 8 for X-ray protection is formed behind that fluorescent screen 7, and the light figure of a fluorescent screen 7 carries out image formation to the film plane of a camera 11 with the mirror lens 10 in a hood 9 through this lead glass 8. On the other hand, two or more phototimer light sensing portions 5 are formed in the interior of the front upper part of this mirror camera hood 9, and it is set as the device in which each phototimer light sensing portion 5 can receive the light of the specific region of the luminescence side of a fluorescent screen 7.

[0015] Therefore, before taking a photograph, it is automatically chosen with the touch panel controller 17 by the signal from a touch panel 4 (change-over switch 18 of drawing 1), and during photography, one of the phototimer light sensing portions 5 corresponding to the specific region suitable for a photography part catches the light of the specific region of a luminescence side, and it detects the selected phototimer light sensing portion 5 as a current signal proportional to X dosage. It integrates with this current signal to the integrating capacitor 12 of a phototimer control section, and it is inputted into a comparator 13 as a voltage signal. On the other hand, a comparator 13 outputs an X-ray cutoff signal to a switch 15, when the voltage signal and reference voltage with which it integrated from the concentration setter 14 with reference to the reference voltage which determines film density are compared and both are in agreement. In response to this signal, the X-ray high-voltage transformer assembly 16 intercepts the high voltage, and stops the X-ray emission from X-ray tube 1.

[0016]

[Effect of the Invention] The X-rays equipment of this invention is constituted as mentioned above, by choosing automatically the phototimer light sensing portion 5 suitable for the posture of analyte by the signal of a touch panel 4, can cancel the complicated activity before a way person's photography, and can obtain the X-ray photograph film of optimum density by X-ray automatic exposure control.

[0017]

[Translation done.]

* NOTICES *

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. **** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is drawing showing one example of the X-rays equipment of this invention.

[Drawing 2] It is drawing showing the principle of a touch panel.

[Drawing 3] It is drawing showing the relation between the input signal of a touch panel, and time amount.

[Drawing 4] It is drawing showing the condition like the thorax forward surface part of a touch panel.

[Drawing 5] It is drawing showing the condition of the thorax side-face part of a touch panel.

[Drawing 6] It is drawing showing the conventional X-rays equipment.

[Drawing 7] It is drawing showing the division light sensing portion of an image reception area.

[Description of Notations]

- 1 -- X-ray tube 2 -- Collimator
3 -- Analyte 4 -- Touch panel
5 -- Phototimer light sensing portion 6 -- Grid
7 -- Fluorescent screen 8 -- Lead glass
9 -- Hood 10 -- Mirror lens
11 -- Camera 12 -- Integrating capacitor
13 -- Comparator 14 -- Concentration setter (reference voltage)
15 -- Switch 16 -- X-ray high-voltage transformer assembly
17 -- Touch panel controller 18 -- Change-over switch
19 -- X-radiator 20 -- X-carrier pendulum
21 -- Y-radiator 22 -- Y-carrier pendulum
23 -- Dispatch signal 24 -- Input signal
25 -- Light sensing portion for thorax transverse planes 26 -- Light sensing portion for thorax side faces
27 -- Image reception area 28 29 -- Touch part
30 -- About a thorax forward surface part 31 -- Thorax side-face part
MC -- Mirror camera

[Translation done.]

(19)日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11)特許出願公開番号

特開2000-23959

(P2000-23959A)

(43)公開日 平成12年1月25日(2000.1.25)

(51)IntCl ⁷	識別記号	F I	テーマコード(参考)
A 6 1 B 6/00	3 2 0	A 6 1 B 6/00	3 2 0 M 4 C 0 9 2
H 0 5 G 1/44		H 0 5 G 1/44	Z 4 C 0 9 3

審査請求 未請求 請求項の数 1 O L (全 5 頁)

(21)出願番号 特願平10-198906

(22)出願日 平成10年7月14日(1998.7.14)

(71)出願人 000001993

株式会社島津製作所

京都府京都市中京区西ノ京桑原町1番地

(72)発明者 片山 智視

京都市中京区西ノ京桑原町1番地 株式会
社島津製作所三条工場内

(74)代理人 100097892

弁理士 西岡 義明

Fターム(参考) 4C092 AAD1 AB03 AB13 ACD1 CC03

CD02 CE11 CF11 DD10

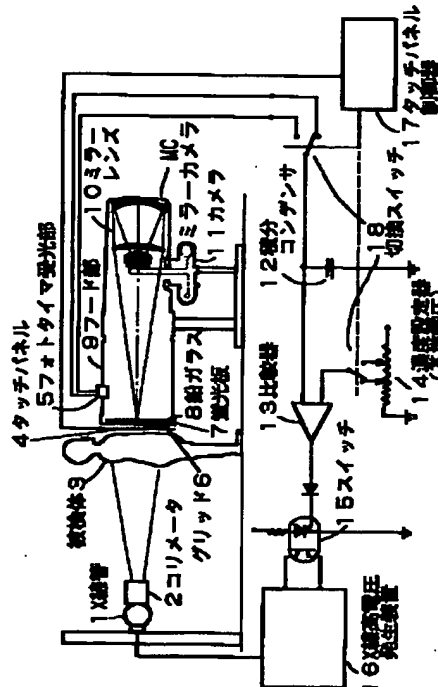
4C093 CA10 FA18 FA59 FD09

(54)【発明の名称】 X線撮影装置

(57)【要約】

【課題】被検者が撮影体位で撮影台に接触するだけで、複数のフォトタイム受光部の選択が自動的に行われるX線撮影装置を提供する。

【解決手段】被検体3が撮影体位でタッチパネル4に触れると、その信号によりタッチパネル制御器17のCPUが、X-Y座標を演算し接触面を認識して、複数のフォトタイム受光部5から最適なフォトタイム受光部を選択し、切換スイッチ18を自動的に切り換えて、撮影に入る。X線管1からのX線はコリメータ2で絞られ、被検体3を透過してグリッド6で散乱線が除去され、蛍光板7で光像に変換される。鉛ガラスを通して発光する光の特定部分のみを、フォトタイム受光部5で捉え、その電気信号を積分コンデンサ12で積分し、その電圧と濃度設定器14の基準電圧を比較器13に入力し、両者の電圧が同じになった時、スイッチ15に高電圧遮断信号を送り、X線高電圧発生装置16の高圧を遮断し、X線放射を停止することにより、最適濃度でX線写真を撮ることができる。



【特許請求の範囲】

【請求項1】被検体の透過X線を検出する複数のフォトタイマ受光部と、フォトタイマ受光部からの電気信号の積分値が基準電圧に達したときX線遮断信号を高電圧装置に送るフォトタイマ制御回路とを備えたX線撮影装置において、撮影台のX線入力面に被検体体位を検出するタッチパネルを設け、タッチパネルの検出信号により前記複数のフォトタイマ受光部から被検体体位に適したフォトタイマ受光部を自動的に選択することができる手段を備えることを特徴とするX線撮影装置。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、X線撮影装置に関し、特にX線写真撮影時のフィルム濃度を自動的に最適に制御する自動露出制御に関する。

【0002】

【従来の技術】X線写真撮影における自動露出制御装置はほとんどの間接撮影に用いられ、胸部、腹部などの直接撮影にも広く利用されている。自動露出制御装置は、撮影時間を自動制御することによりフィルム濃度を一定に保つように作動するもので、被検体を透過したX線量を電気信号に変換し、この電流量が一定値に達したときX線を遮断し、希望するフィルム濃度を得ようとするものである。

【0003】図6に従来の胸部の集団検診に用いるX線間接撮影用のミラーカメラMCを用いた自動露出制御のX線撮影装置について説明する。X線管1からのX線ビームがコリメータ2で必要な視野サイズに絞られ被検体3に照射される。被検体3を透過したX線はグリッド6で散乱線が除去され蛍光板7に入射し、透過X線により光像に変換される。その蛍光板7の後ろにX線防護のための鉛ガラス8が設けられ、この鉛ガラス8を通してフード部9内のミラーレンズ10により蛍光板7の光像がカメラ11のフィルム面に結像する。一方、このミラーカメラMCのフード部9の前方上方内部に複数のフォトタイマ受光部5が設けられており、蛍光板7の発光面の特定領域の光をそれぞれのフォトタイマ受光部5が受光できる機構に設定されている。従って撮影する前に、撮影部位に適した特定領域に対応したフォトタイマ受光部5の一つを、制御パネル上で術者が手動で選択（図6の40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819 1820 1821 1822 1823 1824 1825 1826 1827 1828 1829 1830 1831 1832 1833 1834 1835 1836 1837 1838 1839 1840 1841 1842 1843 1844 1845 1846 1847 1848 1849 1850 1851 1852 1853 1854 1855 1856 1857 1858 1859 1860 1861 1862 1863 1864 1865 1866 1867 1868 1869 1870 1871 1872 1873 1874 1875 1876 1877 1878 1879 1880 1881 1882 1883 1884 1885 1886 1887 1888 1889 1890 1891 1892 1893 1894 1895 1896 1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940 1941 1942 1943 1944 1945 1946 1947 1948 1949 1950 1951 1952 1953 1954 1955 1956 1957 1958 1959 1960 1961 1962 1963 1964 1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050 2051 2052 2053 2054 2055 2056 2057 2058 2059 2060 2061 2062 2063 2064 2065 2066 2067 2068 2069 2070 2071 2072 2073 2074 2075 2076 2077 2078 2079 2080 2081 2082 2083 2084 2085 2086 2087 2088 2089 2090 2091 2092 2093 2094 2095 2096 2097 2098 2099 2100 2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143 2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2157 2158 2159 2160 2161 2162 2163 2164 2165 2166 2167 2168 2169 2170 2171 2172 2173 2174 2175 2176 2177 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239 2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282 2283 2284 2285 2286 2287 2288 2289 2290 2291 2292 2293 2294 2295 2296 2297 2298 2299 2300 2301 2302 2303 2304 2305 2306 2307 2308 2309 2310 2311 2312 2313 2314 2315 2316 2317 2318 2319 2320 2321 2322 2323 2324 2325 2326 2327 2328 2329 2330 2331 2332 2333 2334 2335 2336 2337 2338 2339 2340 2341 2342 2343 2344 2345 2346 2347 2348 2349 2350 2351 2352 2353 2354 2355 2356 2357 2358 2359 2360 2361 2362 2363 2364 2365 2366 2367 2368 2369 2370 2371 2372 2373 2374 2375 2376 2377 2378 2379 2380 2381 2382 2383 2384 2385 2386 2387 2388 2389 2390 2391 2392 2393 2394 2395 2396 2397 2398 2399 2400 2401 2402 2403 2404 2405 2406 2407 2408 2409 2410 2411 2412 2413 2414 2415 2416 2417 2418 2419 2420 2421 2422 2423 2424 2425 2426 2427 2428 2429 2430 2431 2432 2433 2434 2435 2436 2437 2438 2439 2440 2441 2442 2443 2444 2445 2446 2447 2448 2449 2450 2451 2452 2453 2454 2455 2456 2457 2458 2459 2460 2461 2462 2463 2464 2465 2466 2467 2468 2469 2470 2471 2472 2473 2474 2475 2476 2477 2478 2479 2480 2481 2482 2483 2484 2485 2486 2487 2488 2489 2490 2491 2492 2493 2494 2495 2496 2497 2498 2499 2500 2501 2502 2503 2504 2505 2506 2507 2508 2509 2510 2511 2512 2513 2514 2515 2516 2517 2518 2519 2520 2521 2522 2523 2524 2525 2526 2527 2528 2529 2530 2531 2532 2533 2534 2535 2536 2537

から構成され、フォトタイマ制御部は切換えスイッチ18と積分コンデンサ12と濃度設定器14と比較器13とスイッチ15から構成されている。

【0010】本発明に使用されているタッチパネル4は、間接撮影用ミラーカメラMCのフード部9の、被検体3を透過したX線像の入射する受像面の前面に取り付けられている。このタッチパネル4は超音波表面弾性波方式のタッチ位置検出方式を利用したもので、光透過率がほぼ90%程度のガラス製のパネルプレートで、CRTモニタやLCDモニタのディスプレイ面等に貼りあわせて使われる。ここでは透明である必要はないが、ミラーカメラMCのフード部9のX線入射側表面にフォトタイマ受光部5の採光範囲が表示されているので、これを観察することができる。

【0011】このタッチパネル4は図2に示すように、パネルの隅にある超音波発振子(X-発振子19、Y-発振子21)から発生する超音波が、表面弾性波として反射アレイ上を伝わり、反射アレイの各スリットにより反射され、パネルの隅々まで行き渡り、パネル上を行き渡った表面弾性波は、対辺の反射アレイにより集約され、受振子(X-受振子20、Y-受振子22)に戻る。その時最短距離aを通る表面弾性波と最長距離cを通る表面弾性波では、到達時間に時間差を生じ、その時間差の中でB点で被検体部がタッチしていると、bを通る表面弾性波は被検体部に吸収され、弱まった波形として受振子に戻り、位置検出データとして認識される。その被検体部に吸収される表面弾性波の量を、Z方向データとして認識することもできる。図3はその発信信号23と受信信号24の時間的な強度変化を示す。この時間的な位置をX座標、Y座標にタッチパネル制御器17のCPUが変換する。

【0012】次に、本発明のX線撮影装置の操作について説明する。まず、被検体3が撮影台に立ち、撮影する体位でタッチパネル4に体を押しつける。図4は、胸部正面部位30の場合の受像面27面へのタッチ部分29を示し、図5は、胸部側面部位31の場合の受像面27面へのタッチ部分28を示しているが、これら図4、図5は胸部の正面撮影と側面撮影において、最適フィルム濃度を得るためにフォトタイマ受光部5の採光部分の選択が必要であることを示している。

【0013】まずタッチパネル4はそのタッチ信号をタッチパネル制御器17のCPUに送り、その被検体のタッチ部分(図4の29または図5の28)のX座標とY座標が、タッチパネル制御器17のCPUにて読み取られる。この座標パターンを認識して複数のフォトタイマ受光部5のうちから、最適な採光範囲を持つフォトタイマ受光部5を選択する。図1では、胸部正面用と胸部側面用の2つのフォトタイマ受光部5が備えられた場合を示す。その選択のための切換えスイッチ18が、タッチパネル制御器17の信号で切り換えられる。切換えスイッチ

18はフォトタイマ受光部5の切換と、それに適したフィルム濃度を決める濃度設定器14の基準電圧を切り換える。切換えスイッチ18の動作は自動的に行なわれ、術者が手動で設定する必要が無い。

【0014】この状態でX線撮影が始められる。その動作は従来の装置と同じで、X線管1からのX線ビームがコリメータ2で必要な視野サイズに絞られ、被検体3に照射される。被検体3を透過したX線はグリッド6で散乱線が除去され蛍光板7に入射し、透過X線により光像に変換される。その蛍光板7の後ろにX線防護のための鉛ガラス8が設けられ、この鉛ガラス8を通してフード部9内のミラーレンズ10により蛍光板7の光像がカメラ11のフィルム面に結像する。一方、このミラーカメラフード部9の前方上方内部に複数のフォトタイマ受光部5が設けられており、蛍光板7の発光面の特定領域の光をそれぞれのフォトタイマ受光部5が受光できる機構に設定されている。

【0015】従って撮影する前に、撮影部位に適した特定領域に対応したフォトタイマ受光部5の一つが、自動的にタッチパネル4からの信号でタッチパネル制御器17で選択されており(図1の切換えスイッチ18)、撮影中、選択されたフォトタイマ受光部5は、発光面の特定領域の光を捉え、X線量に比例した電流信号として検出する。この電流信号はフォトタイマ制御部の積分コンデンサ12に積分され電圧信号として比較器13に入力される。一方、比較器13は濃度設定器14からフィルム濃度を決定する基準電圧を参照して、積分された電圧信号と基準電圧を比較し両者が一致したときにスイッチ15にX線遮断信号を出力する。X線高電圧発生装置16はこの信号を受けて、高電圧を遮断し、X線管1からのX線放射を停止させる。

【0016】

【発明の効果】本発明のX線撮影装置は上記のように構成されており、被検体の体位に適したフォトタイマ受光部5を、タッチパネル4の信号で自動的に選択することによって、術者の撮影前の煩雑な作業が解消でき、X線自動露出制御により最適濃度のX線写真フィルムを得ることができる。

【0017】

【図面の簡単な説明】

【図1】 本発明のX線撮影装置の一実施例を示す図である。

【図2】 タッチパネルの原理を示す図である。

【図3】 タッチパネルの受信信号と時間との関係を示す図である。

【図4】 タッチパネルの胸部正面部位の状態を示す図である。

【図5】 タッチパネルの胸部側面部位の状態を示す図である。

【図6】 従来のX線撮影装置を示す図である。

6

17…タッチパネル制御器 タッチ

18…切換スイ

19...X-発振子
子

20...X-受振

2…コリメータ
4…タッチパネ

21...Y-発振子
子

22...Y-受振

6…グリッド

23…発信信号

24…受信信号

8…鉛ガラス

25…胸部正面用受光部
用受光部

26...胸部側面

9...フード部
ズ

10…ミラーレン

27…受像面

28、29…タ

1 1...カメラ
デンサ

12…積分コン

ツチ部分

13...比較器
器(基準電圧)

14…濃度設定

30…胸部正面部位 部位

3 1 …胸部側面

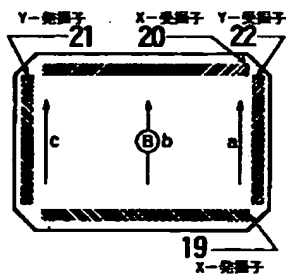
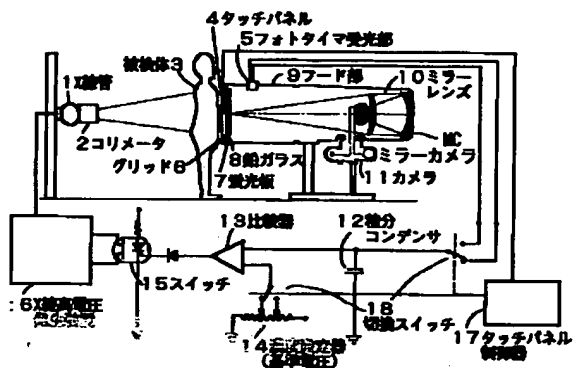
15…スイッチ

16...X線高電

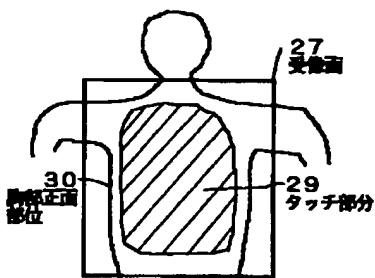
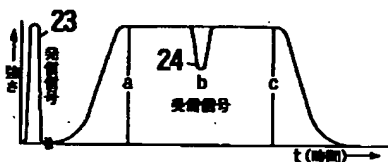
MC…ミラーカメラ

圧発生装置

【图2】



【図4】



【图5】

